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(54) Method for the manufacture of razors and razor assembly obtained by this method.

(57) A support member 3 of metallic or plastics material is placed in a tool cavity against an imperforate blade member 1 of stainless steel, backed by a die 4 having through holes 6. A punch 9 is impacted against the support member, which undergoes plastic deformation and pierces the blade member locally and is extruded through the blade into the holes 6 to form projections which are subsequently riveted over to secure the assembly.

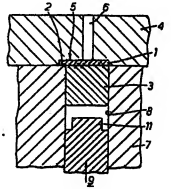

Fig. 1.

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TITLE MODIFIED
see front page

Method and apparatus for
the manufacture of razors.

This invention relates to the manufacture of razors, and more particularly to a method of permanently attaching a blade member to a support.

Various methods have been proposed and practised, but as far as we are aware they have all involved either welding the blade member to its support or forming the support member with projections which pass through pre-formed holes in the blade member and are then rivetted over to secure the assembly.

Welding has the disadvantage that the heat necessarily generated alters the metallurgical structure of the blade member around the weld zone and thereby introduces the risk of corrosion of the blade member. The formation of holes in the blade member involves additional complications in manufacture of the blade member.

The present invention provides a method of attachment which avoids the above stated disadvantages

and which permits a wide variety of materials, metallic and non-metallic to be employed for the support member.

In accordance with a feature of the invention there is provided a method of attaching a razor blade member to a support member of cold deformable material, in which the blade member has one surface contacted by a die having at least one die-hole in its blade supporting surface, and the support member is placed against the opposite surface of the blade member and is subjected, by a punch, to compressive forces sufficient to effect cold deformation of the support member, causing it to pierce and extrude through the blade member into the die-hole, the material thus extruded through the blade member subsequently being riveted over to secure the members together.

The method of the invention thus avoids the risk of metallurgical degradation inherent in welding techniques. The conventional rivetting techniques mentioned above involve the provisions of pre-formed holes in the blade member, and pre-formed projections (rivets) on the support member, which must be accurately aligned with the blade member holes and accurately controlled in their cross-section to produce a good fit in the holes. These complications are avoided by the method of the invention since the extruded projections make their own holes in the blade member. Furthermore, it is possible to produce 'rivet' diameters and holes smaller than would normally be possible in the case of pre-formed holes formed by conventional mass production techniques.

A method in accordance with the invention, and press tools for performing it, are described in more detail below, by way of example, with reference to the accompanying drawing, in which:-

Figure 1 is a cross sectional view of a press tool;

Figures 2 and 3 are cross-sectional views of the blade member and support member in an intermediate and a final stage of the process; and

Figure 4 is a scrap perspective view of a modified press tool punch.

A narrow, imperforate blade member 1 is formed by an imperforate strip of hardened stainless steel sharpened to a cutting edge at 2, and is to be attached to a blade support 3 of wire-like form, and of somewhat narrower width than the blade member 1. The support 3 may, for example, be of aluminium or aluminium alloy, steel, brass or synthetic plastics material, such as polyester.

The press tool comprises a die 4 having a shallow recess 5 to receive the blade member, and is formed with a number of through holes 6, spaced apart longitudinally of the blade member, and opening into the main surface of the recess against which the blade member is supported.

The tool also comprises a platen 7 having a rectangular slot 8 to locate and confine the support member, and a ram 9 which is a close fit in the slot 8. The inner surface of the ram is shown here as having a head portion 11 of lesser width than the remainder of the ram, since it is desired to form a channel at the underside of the support member, but the head portion could take other forms.

With the blade member and support member located as shown in Figure 1, the ram is advanced to apply high compressive forces to the support member to effect plastic deformation thereof. The "hydrostatic pressures" thus generated in the support material cause it to pierce the blade strips at its unsupported points opposite the holes 6 and to be extruded through the blade member, a slug 1A of the blade material being punched out and

carried upwardly by the extruded material, as illustrated at 12 in Figure 2. In this condition the partially completed assembly is removed from the press tool leaving the slug of blade material in the die hole, and the extruded pips 12 are then riveted over to form retaining heads 13, as shown in Figure 3, to complete the assembly.

Using the above described method and press tool, we have secured stainless steel blade strips of 0.038 mm and 0.1 mm thickness to supports made from aluminium, brass, steel and various plastics materials e.g. nylon polystyrene polyester and acetal copolymer.

In one specific case, the blade member has an overall length of 38 mm, a width of 1.15 mm and is 0.038 mm thick, and the die has 18 holes equally spaced apart, each hole being of 0.25 mm diameter.

In the embodiment described above, a single punch operates over substantially the whole of the under-surface of the support 3. In this case it will usually be necessary to confine closely the longitudinal side edges of the support material so as to prevent lateral deformation thereof.

Less lateral support is required when using the modified press tool shown in Figure 4, in which the punch 31 is formed with discrete punch portions formed by cylindrical pins 32, each aligned with a respective die hole 6. Lateral support for the pins is provided by a pressure pad 33 through which the pins slide during the piercing and extruding operation. The pins 32 are of larger diameter than the die holes with which they co-operate.

In general, larger die-holes will be required for softer support materials and for blade members of greater thickness. We have found that with a relatively soft support material, such as aluminium, having a hardness of 40 VPN in the Vickers Diamond Pyramid Test

scale, a die-hole diameter of at least 0.4 mm and a punch diameter of at least 0.5 mm are necessary to produce a satisfactory rivet from a strip of support material 0.71 mm thick.

It is preferable to employ support materials having a hardness of 100 VPN or more.

Tests carried out on age-hardened aluminium having a hardness of 100 VPN have yielded satisfactory results with each of the following combinations of die-hole diameter/punch diameter (all expressed in mm). 0.27/0.35; 0.35/0.40; 0.45/0.50; 0.50/0.55, all with a support 0.71 mm thick and with a stainless steel blade 0.038 mm thick.

Similar combinations were found suitable with a support material having a hardness of 135 VPN with die-hole sizes from 0.27 mm to 0.50 mm.

For each of the materials mentioned above it was found desirable or necessary to provide a punch whose diameter was 0.05 mm larger than the die-hole.

Although the invention can be applied with particular advantage to the production of a blade/support unit of the form described and illustrated herein, those skilled in the art will appreciate the applicability of the invention to a wide variety of forms. Units thus formed can be assembled into razor heads of metal or plastics material having a separately formed guard, or the support member may be an integral part of such a razor head.

CLAIMS:

1. Method of attaching a razor blade member to a support member of cold deformable material, characrerised in that the blade member (1) has one surface contacted by a die (4) having at least one die hole (6) in its blade supporting surface, and the support member (3) is placed against the opposite surface of the blade member and is subjected, by a punch (9,31) to compressive forces sufficient to effect cold deformation of the support member, causing it to pierce and extrude through the blade member into the die hole, the material (12) thus extruded through the blade member subsequently being riveted over (13) to secure the members together.

2. Method according to claim 1, in which the die is formed with a plurality of die-holes and the support member is caused to pierce and extrude through the blade member into the respective die holes simultaneously.

3. Method according to claim 1 or 2 wherein the blade member is of stainless steel.

4. Method according to claim 3 wherein the blade member is 0.038 mm thick.

5. Method according to claim 3 or 4 wherein the or each die hole has a diameter in the range of 0.25 mm to 0.50 mm.

6. Method according to claim 3 4 or 5, wherein the support member is composed of material having a hardness of between 40 VPN and 135 VPN.

7. Method according to any preceding claim, wherein the punch has one or more projecting punch portions (32) each

(6)
aligned with a respective die-hole/and having a circular cross-section whose diameter is at least 0.05 mm larger than the respective die-hole.

8. A riveted assembly of a razor blade member and a support member when made by the method of any preceding claim.

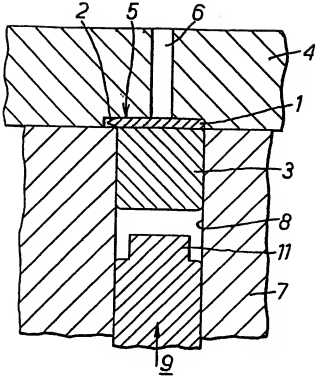

FIG. 1.

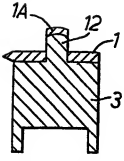

FIG. 2.

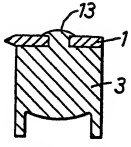

FIG. 3.

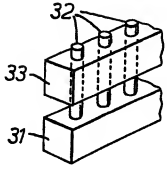

FIG. 4.

European Patent Office

EUROPEAN SEARCH REPORT

0011452

Application number

EP 79 30 2511

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	GB - A - 1 065 933 (EVERSHARP) * Pages 2,3,4; figures 1-5 *	1
A	GB - A - 1 327 381 (TOLWOOD) * Pages 3,4; figures 3,4,5,6 *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

B 26 B 21/54
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TECHNICAL FIELDS SEARCHED (Int.Cl. ³)

B 26 B
B 21 K

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11-02-1980	WOHLRAPP

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